

20: CLT-based Confidence Intervals for Means

Stat 120 | Fall 2025

Prof Amanda Luby

1. (Adapted from Exercise 6.128)

Plastic microparticles contaminate shorelines. Much of the pollution comes from washing fleece clothing. In a recent study, washing a fleece garment discharged on average $\bar{X} = 290$ fibers per liter of wastewater. The standard deviation was $s = 87.6$ fibers and the sample size was $n = 120$.

- (a) What is the estimated *standard error* of the average number of fibers discharged per liter of wastewater when washing a fleece garment?
- (b) The table below gives some percentiles of the t_{119} distribution. Use this information to construct a 99% confidence interval for the population mean. Interpret the interval in context.

| percentage | percentile (<code>qnorm(percentage)</code>) |
|------------|-----------------------------------------------|
| 90% | 1.3 |
| 95% | 1.6 |
| 97.5% | 2.0 |
| 99% | 2.3 |
| 99.5% | 2.6 |

- (c) What sample size would we need if we wanted this interval to be *no wider* than 20?